



## **Climatic Changes in Lebanon, Predicting Uncertain Precipitation Events. Do climatic cycles exist?**

Dr. A. R. M. Arkadan

Hariri Canadian University, School of Sciences & Information Systems, Meshref- Damour, Lebanon (arkadanam@hcu.edu.lb)

### **ABSTRACT**

Climatic changes are the most discussed topic in recent years as they have a great influence on the surface hydrology. Understanding the hydrological properties of a study area requires an investigation of the main source of replenishment to the aquifer. In Lebanon such replenishment is being provided by precipitation. Developing water resources information in Lebanon is being challenged by the absence of adequate and accurate required hydrological data.

With precipitation being the main drive of water balance variation over space and time, changes in the type and amount of precipitation can have a very important implication on the hydrology and water resources.

The wet season in Lebanon occurs between the months of November and April with variable wet periods during September-October and May where precipitation is governed by the early or late arrival of vapor saturated clouds. Precipitation in Lebanon is controlled by its orographical feature where the moist air that passes over the Mediterranean reaches the coast from the west is being uplifted and moves towards the mountains. Precipitation increases on the windward slopes and decreases on the leeward slopes with the band of high annual precipitation exist parallel to the mountain range along their seaward slope and coastal area.

The annual average rainfall along the coastal zone during the observed period 1965-1999, ranges between 540 and 1110 mm, whereas the annual average precipitation (rain and snow) over the mountain area ranges between 937 and 1854 mm for the same period.

A study area located north of the country and extends from the coast to the upper westerly slopes of the Mount Lebanon Mountain Range has been chosen as a case study zone. The area is bounded by a two river basins, Jaouz and Ibrahim. It was chosen as a case study since it faces the westerly and north westerly wind that brings precipitation to Lebanon during the rainy season. The study did not include the Bekaa Region located east of Mount Lebanon Mountain Range.

Analysis of precipitation data is important in predicting the occurrence of uncertain events with time and to determine if there is a meteorological cycle in which periods of heavy precipitation or drought events are part of a climatic cycle. Because of the extreme variability of precipitation events it is necessary to use several methods to estimate the processes and the force behind it if present. Methods such as moving average, probability of exceedence, coherent rainfall and statistics concepts are used to aid in defining theses events.

Results showed that a possible cyclicity occurs at a return period of 14 years but of low coherence. This could be related to the amount of data which covers a period of 35 years, which might not be enough to determine whether a climatic cyclicity controls the prevailed climatic conditions over Lebanon.